

Remarks

Status of the Claims

Claims 1-3, 5-7, 11-20, 22-24, and 28-54 are pending.

Claims 11-17 and 28-34 are withdrawn from consideration.

Claims 1-3, 5-7, 18-20, 22-24, and 35-54 are rejected.

The Drawings

The drawings were objected to under 37 C.F.R. §1.83(a), which sets forth that the drawings must show every feature of the invention specified in the claims, for failing to show the arithmetic device recited in claims 1, 5, 40, and 41 and the comparator recited in claim 44. Applicants submit that the drawings do show embodiments of these features and, thus, satisfy the requirements of 37 C.F.R. §1.83(a).

The functions of the arithmetic device (e.g., to subtract crosstalk between signals from different detectors) and the comparator (to compare signals from different detectors), both described at pages 6-7, paragraph 0019 (see, also, Figs. 24-27), are carried out by the SHARC event assembly, 262 in Fig. 20, part of the master data acquisition module, 210 in Figs. 11, 12, 17, and 20 (see page 24, paragraph 79). Thus, the figures do show the arithmetic device recited in claims 1, 5, 40, and 41 and the comparator recited in claim 44, and, thus, satisfy the requirements of 37 C.F.R. §1.83(a).

Applicants request reconsideration and withdrawal of the objection to the drawings for the reasons set forth above.

The Objections to the Specification

Applicants have amended page 13 of the specification to correct the typographical errors pointed out by Examiner (Office action, §2). The amendments to the specification do not introduce new matter.

The specification was objected to as failing to provide proper antecedent basis for the claimed subject matter as required by 37 C.F.R. §1.75(d)(1) (Office action, §3). Examiner stated that the basis for the objection was that the specification does not provide a reason why the arithmetic device is a distinguished feature of the invention.

Applicants respectfully submit that this objection is improper and that the specification meets the requirements of 37 C.F.R. §1.75(d)(1).

37 C.F.R. §1.75(d)(1) sets forth:

The claim or claims must conform to the invention as set forth in the remainder of the specification and the terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description.

The specification describes an embodiment of the invention having an arithmetic device at page 6, paragraph 0019. This description provides support for claims drawn to the invention having an arithmetic device and, further, provides antecedent basis for the terms and phrases used in the claims. The meaning of the terms in the claims may be ascertainable by reference to the description. Thus, the specification satisfies the requirements of 37 C.F.R. §1.75(d)(1). Applicants request the withdrawal of the objection to the specification for the reasons set forth above.

The Rejection of Claims 35-39, 44, 45-49, and 53 Under 35 U.S.C. §102

Claims 35-39, 44, 45-49, and 53 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,150,313 ("the '313 patent") (Office action, §7). More specifically, Examiner cited the parallel pulse processing circuitry shown in Fig. 5A and described at column 8 of the '313 patent. Applicants traverse for the reasons set forth below.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference (*Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)). Below, Applicants review the teaching of the '313 patent, and Fig. 5A in particular, and show that the '313 patent fails to teach or suggest at least one critical element of the claimed invention and, thus, fails to anticipate the claimed invention.

The '313 patent describes a parallel pulse-processing system for a flow cytometer in which a discrete analog value representing a characteristic of each signal pulse (such as the height, area, or width) is converted into a discrete digital value representing the same characteristic. Referring to Fig. 5A of the '313 patent, three detectors (20a, 20b, and 20c) are illustrated, each connected to a respective input channel (21a, 21b, and 21c). Each

input channel consists of a pulse sample/hold (PSH) circuit (22a, 22b, and 22c), an analog-to-digital converter or ADC (23a, 23b, and 23c) and a first-in, first-out (FIFO) buffer (24a, 24b, and 24c), all connected in series. A central timing unit (25), comprising a threshold-type analog trigger unit (28) and a digital delay line (29), synchronizes the timing of the pulse digitization process by detecting an event on the first channel (21a) and then triggering the PSH circuits of all three channels in the proper sequence.

In the circuitry of Fig. 5A of the '313 patent, pulse digitization is carried out by the combination of the PSH circuit (22a, 22b and 22c) and the ADC (23a, 23b, and 23c) in each channel. The function of the PSH and ADC in pulse digitization are described at column 5, lines 51 through 58 of the '313 patent:

In the processing system of the invention, the pulse digitization has been divided into two steps that are carried out by separate circuits. An externally gated analog pulse sample/hold circuit (PSH) translates pulse size (the height, area or width of an input pulse) into a voltage (Fig. 2B). This voltage is accepted by a track/hold circuit at the input of an analog-to-digital converter (ADC).

Thus, the '313 patent teaches the use of a PSH circuit to produce a discrete analog value representing a characteristic of the entire input pulse from an event (such as its height, area or width) that can be converted by the ADC into a discrete digital value representing the same characteristics.

In contrast to the teachings of the '313 patent, the invention of claims 35-39, 44, 45-49, and 53 relates to a pulse-processing system for a flow cytometer in which each detector pulse from an event is converted into a sequence of digital values rather than into a single digital value that characterizes the entire pulse. This critical element of the claimed invention is specified in system claim 35 (and, consequently, dependent claims 36-39 and 44) as follows, wherein the "first signal" and the "second signal" refer to "signals representative of an event":

a sampling device, adapted to receive portions of a first signal from said first detector in time sequence and to generate a respective value representative of the respective magnitude of each respective portion of said first signal as said respective portion of said first signal is being received, and to receive portions of a second signal from said second detector in time sequence and to generate a respective value representative of the respective magnitude of each respective portion of said second signal as said respective portion of said second signal is being received

Similarly, this critical element of the claimed invention is specified in method claim 45 (and, consequently, dependent claims 46-49 and 53) as follows, wherein "said first and second signal" refer to "signals representative of an event":

receiving portions of said first signal and said second signal in time sequence, [...];
generating a respective value representative of the respective magnitude of each respective portion of said first signal as said respective portion of said first signal is being received;
generating a respective value representative of the respective magnitude of each respective portion of said second signal as said respective portion of said second signal is being received;

This critical element of the claimed invention in which each detector pulse from an event is converted into a sequence of digital values (see, for example, Fig. 21) distinguishes the claimed invention from the teachings of the '313 patent, wherein each pulse from an event is converted into a single analog value that characterizes the entire pulse, which is then converted into a single digital value. The '313 patent fails to teach or suggest this critical element of the claimed invention and, thus, fails to anticipate the claimed invention.

In summary, the claimed invention is fundamentally different from the parallel pulse-processing system taught by the '313 patent. The present invention allows digitizing the entire waveform of the signal from an event, whereas the '313 patent teaches obtaining only a single value representative of a characteristic of the entire signal from an event. As the '313 patent fails to teach at least this critical element of the claimed invention, the '313 patent fails to anticipate the claimed invention.

Applicants request reconsideration and withdrawal of the rejection of claims 35-39, 44, 45-49, and 53 under 35 U.S.C. §102(b) in view of the above remarks.

The Rejection of Claims 1-3, 5-7, 18-20, 22-24, 40-43, and 50-52 Under 35 U.S.C. §103

Claims 1-3, 5-7, 18-20, 22-24, 40-43, and 50-52 were rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 5,150,313 ("the '313 patent") in view of Bierhoff (U.S. Patent No. 4,813,031 ("the '031 patent")) (Office action §5). Applicants traverse for the reasons set forth below.

The critical teaching of the '313 patent is summarized in the previous section with respect to the rejection of claims 35-39, 44, 45-49, and 53 under 35 U.S.C. §102(b). Examiner cited the secondary reference, the '031 patent, as teaching "arithmetically combining a designated value (a bar) with each of said values" (Office action, page 5, lines 7-8). Applicants show below that the teachings of the '313 and '031 patent, alone or in combination, fail to teach or suggest the claimed invention.

As with the invention of claims 35-39, 44, 45-49, and 53, the invention of claims 1-3, 5-7, 18-20, 22-24, 40-43, and 50-52 relates to a pulse-processing system for a flow cytometer in which each detector pulse from an event is converted into a sequence of digital values rather than into a single digital value that characterizes the entire pulse. This critical element of the claimed invention is specified in system claim 1 (and, consequently, dependent claims -3, 5-7, 18-20, 22-24, and 40-43) as follows, wherein "said signal" refers to a "signal representative of an event":

a sampling device, adapted to receive portions of said signal from said detector in time sequence and to generate a respective value representative of the respective magnitude of each respective portion of said signal as said respective portion of said signal is being received

Claims 50-52 depend from method claim 45, which, as discussed in the previous section, also recites this critical element.

As shown in the previous section, the '313 fails to teach or suggest digitizing portions of each pulse's waveform as it is received, as in the claimed invention. The additional teaching of the '031 patent of arithmetically combining a designated value with the value obtained after pulse-processing does nothing to make up for the failure of the '313 patent to teach or suggest the distinct pulse-processing of the claimed invention. The combined teachings of the '313 and '031 patent, alone or in combination, fail to teach or suggest digitizing portions of each pulse's waveform as it is received, as in the claimed invention, and thus fail to teach or suggest the claimed invention.

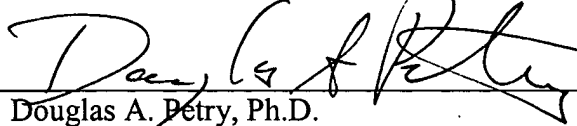
Applicants request reconsideration and withdrawal of the rejection of claims 1-3, 5-7, 18-20, 22-24, 40-43, and 50-52 under 35 U.S.C. §103 in view of the above remarks.

Conclusion

Applicants respectfully submit that all rejections have been traversed or rebutted and that the application is in condition for allowance. Applicants respectfully request that all pending claims be allowed.

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Date

Respectfully submitted,



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